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IMPACT OF DIGITAL SCREEN USE ON COGNITIVE FUNCTIONING, EMOTIONAL REGULATION AND QUALITY OF LIFE IN ADOLESCENCE

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Brief general intro

Adolescence marks the important stage of life, which embraces physical and mental changes in an individual. This stage provides relevance to study the interaction between life style, environment, social identity, psychological and bodily changes over the period. The use of technology in the era has brought up numerous effects on these factors thereby producing new area for research and studies. Digital screen use is one among them which is found to be raising the scope for study and know the impact on adolescent well-being. The present study was conducted on cognitive functioning, emotional regulation and health-related quality of life in adolescence using digital screen. The study throws light on theoretical framework, association of screen use with cognitive functioning, emotional regulation and quality of life along with interaction of gender, domicile across age and levels of digital screen use.

Adolescence

Adolescence is a period between a child and an adult. According to WHO "adolescence is a phase of development on many fronts: from the appearance of secondary sex characteristics (puberty) to sexual and reproductive maturity; the development of mental processes and adult identity; and the transition from total socio-economic and emotional dependence to relative independence".

Digital screen use in adolescence

"Screen time (ST) refers to time spent engaging with visual screen-based technologies such as televisions, computers/laptops, videogames, smart phones, tablets/ iPads, and handheld electronic or gaming devices. It includes using of the Internet, social media, or communicating via text message. Solely auditory activities, such as talking on a phone and listening to music, are not included" (Oswald TK et al, 2020). As per the survey report of 2016 at USA, half of the teens found feeling addicted to their mobile devices and also seen with symptoms of anxiety and depression (Common Sense Media, 2016; Underwood MK, Ehrenreich SE, More D, Solis JS, Brinkley DY, 2017). Adolescents who spend 50% of their daily time playing e-games are found to report problems in their overall well-being (Przybylski AK., 2014).

Cognitive functioning in adolescence

Cognitive functioning refers to multiple mental abilities, including learning, thinking, reasoning, remembering, problem solving, decision making, and attention (Gwenith G. Fisher, 2019). "An international group of investigators and researchers has noticed the Internet can develop both intense and prolong transformations in particular areas of cognition, which may reverberate

changes in the brain, disturbing our attentional capacities, memory and social activities and the rest" says Jaswinder Singh (2020).

Digital screen use and cognitive functioning

Screen time usage of more than 2 hours per day increases the social isolation among young adults compared to that of those who use screen time less than 30 mins a day (Primack BA, 2017). The research studies on brain development reports negative impact of high screen time on white matter pathways, which are responsible for reading and language, also poor executive functioning. The study also addresses the concern over the generation affected by screen time, where the age group (young children) who are prone to the development of brain plasticity when exposed to screen use might lead to certain deficiency. (Horowitz-Kraus T, et al., 2018; Hutton JS, 2019; Small, GW et al., 2020).

Emotional regulation in adolescence

Emotion regulation is the process that determines the nature of emotions being experienced and expressed. It could be habitual, conscious or unconscious, and may also involve several components of an emotional response. It is called to be an ongoing process. (Giuliani & Gross, in press). This involves few strategies such as Antecedent focused and response focused strategies. Antecedent focused strategies include regulating the response of the emotions through modification in incoming information before the generation of emotions. This might be through situation selection, situation modification, attentional deployment and cognitive change. Response – focused strategies is based on the expressive, cognitive or physiological emotional response elicited, which includes expressive suppression (Gross, 2001; Gross & John, 2003; Gomez-Ortiz O et al., 2016).

Digital screen use and emotional regulation

The study conducted by Uhls YT et al., (2014) reported that the time spent at the nature camp for five days with the restrictions of screen time have shown improvement in their emotional and social intelligence compared to that of another group who was in continuous with their screen time, which proves the benefits of reduction in screen time in sixth grade students (Small, GW et al., 2020).

Quality of life in adolescence

According to the World health organization (WHO) Quality of Life is defined as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns". As there is high risk of development of psychological/mental and physical health problems in adolescents which will continue into adulthood, identifying and addressing early signs of low quality of life provides an opportunity to ensure that young people have a healthier progression through adolescence (Meade.T & Dowswell. E, 2016)

Quality of life and digital screen use

There is an association between family arguments and the addiction to internet. (V.V et al., 2019; Niedorys B et al., 2018). Time spent on internet also plays a major role in developing addiction. Higher online communication has been adopted by the people who lack social skills and the one who feel inferior with face-to-face communication states social compensation hypothesis (McKenna & Bargh's, 1999). And therefore, as the social networks increase, it might lead to development of loneliness and depression (Lee, S J, 2009). Socializing online among children with low quality of friendships decreases the feelings of depression as it accesses to receiving support (Kardfelt-Winther, D, 2017)

REVIEW OF LITERATURE

Chaudhuri.S et al., (2019) conducted a study which showed that 58.7% are mild addicted, 15% are moderate, showing no significant difference with respect to social general and self-esteem score between internet addicts and non addicts.

Choudhury M. & Ali A (2020) explored a study which has reported 68.4% of sample as non-addict and 31.6% were addicted to social media based on Bergen social media addiction scale. There exists significant difference in gender with a mean rank of males was 216.29 and females was 253.32 showing females to be addicted more to social media.

Freire.T & Ferreira.G (2016) conducted a study which reported the result that showed both positive and negative psychological dimensions predicted health – related quality of life (HRQoL), where depressive symptoms were negative and self-esteem was a positive predictor of overall HRQoL and its domains.

Johnson A R et al., (2022) conducted a study which showed the result where 20% are preoccupied with screens, 26% used screen as a way of escape from the problems, 8% felt moody, restless and irritable when not using, 3.9% has screen addiction and 12% had depression. depressed subjects, males, disturbed home environment such parents who fought frequently and adolescents with less participation in sports found to show higher screen addiction.

Lee.Y E et al., (2017) conducted a study and the result showed that children participated in all those activities along with caregivers is to show high cognitive and/ or linguistic development compared to those engaged in these behaviours just 1-2 times per week. The study encourages the parents to provide opportunities under physical activities which help them to optimize their brain development and co-viewing with parents/caregivers should be encouraged.

Malhotra, S et al., (2022) study result showed that the prevalence rate of excess screen time was 61.8% and there found a significant association with education, occupation of father and the sleep duration less than 8 hours.

Matthew R J & Lisabeth F.D. (2019) examined a study which found that adolescent internalizing problems are related positively with negative health outcomes, whereas negatively

related with physical activity regardless of age measured. Girls reported higher rate of internalizing problems and health outcomes. The study showed the relationship between preschool aged health problems and adolescent problems and health outcomes.

The study conducted by Morin -Major.J et al., (2016) showed that after controlling for sex, age, awakening time, perceived social support & stress, cortical systematic output was negatively associated with Facebook peer interaction and positively with number of Facebook friends. Thus, the study shows that Facebook behaviours are associated with diurnal cortisol concentrations among adolescent boys and girls.

Nagata JM et al., (2021) explored a study in which children reported on average 3.99 hours of screen time per day measured under 6 modalities, where black children reported 1.58 more hours of screen time while Asian children 0.35 less hours compared with white children reporting 3.46 h/day. Among gender, overall, boys reported more screen time in comparison to girls.

The study examined by Park J et al., (2016) indicates an effect of participation in sports on internet addiction mediated by self- control. Thus, the study suggests the need for physical and sport activity in planning the treatment for internet addiction programs, also showing the importance of physical activity in managing the psychological problems in adolescents.

In the study conducted by Shirley SA & Kumar SS (2019) found that there is no significant correlation between screen time duration and other socio demographic variables such as age, gender, SES, education and occupation. The study concluded that among the early childhood, increased screen time is becoming a problem of digital age, which requires appropriate interventions at family, healthcare and social levels.

The study investigated by Shwetha G et al., (2020) observed that mobile formed the maximum used Screen Based Media. Adolescents who spent more time on media (including social media and electronic devices such as smartphone's) were more likely to report mental health issues, so there is a need to create awareness among parents, teachers, and children. There found an association between SBM usage and the socio-demographic status i.e. age, type of family, father's education, and father occupation with the statistical significance of p value <0.05.

The research study by Tran et al., (2017) showed 21.2% of sample with internet addiction, showing more problems with self-care, suffer from pain, discomfort, depression, problems with daily routine and significant interpersonal influence in behaviours and lifestyles. The study showed no significant difference in sociodemographic factors such as age, gender, education, marital status, religion and ethnicity, gender, smoking and alcohol dependence between IA and non-internet addiction groups. The study proved that Internet addiction will result in poor health related quality of life in young Vietnamese.

Tremblay M S et al., (2011) study result showed that sedentary behaviour (specifically watch TV) more than 2 hours per day was associated with decreased fitness, unfavourable composition of body, lower self -esteem, decreased academic achievement and low pro-social behaviour.

The findings from the study conducted by V.S & Rao M S (2022) show that increased internet usage has negative impact on mental health, physical health, self-esteem and social health in adults, also it elevates the level of depression and anxiety. There is no significant relationship of internet addiction under the dimension of social health.

The study examined by Varadarajan S et al., (2021) showed that the prevalence of excessive screen time is 73% which is significantly associated with the mother's screen time, usage of screentime at bedtime, attending school and birth order.

Significance of the Study

Digital screen use being a part of day-to-day life is helping an individual to enhance on well-being as well as on the other side effecting to be apart. Based on the bio-psycho and social factors, screen use impact is impelling for more studies on the sensitive age group of the life span that is adolescents to sustain a better society. This study aims at contributing to the research area of screen use in adolescence, assessing the important psychological variables and identifying the impact of digital screen use on the variables. The study adopting the significant statistical analysis and relevant number of samples provides an additional knowledge on understanding the interaction among the variables and thus helping the prediction of health outcomes to explore the knowledge on framing the policies and guidelines on digital screen use.

METHOD

Preamble of the study

The study aims at exploring the digital screen use and its impact on cognitive functioning, emotional regulation and quality of life in adolescence. The study was conducted across the three levels of adolescence, three levels of screen use, considering the gender and domicile in the regions of Dakshina Kannada. Adhering to the objectives and research questions drafted in the study, the research design and methods were adopted, thus proceeding with the appropriate statistical tools and analysis. The conclusions drawn helps in providing scope for future research areas and laying the importance of health psychologists in promoting awareness and needs among public in a path of accomplishment of sustainable development goals for the visionary India.

Objectives of the study

- To determine whether adolescents with varied levels of digital screen use differ significantly in their cognitive functioning, emotional regulation and quality of life in relation to socio-demographic factors.
- To examine the relationship between cognitive functioning, emotional regulation and quality of life among adolescents with varied levels of digital screen use.
- To study the impact of varied levels of digital screen use on cognitive functioning, emotional regulation and quality of life in adolescents.

Research Questions

- Do adolescents with varied levels of digital screen use differ significantly in their cognitive functioning, emotional regulation and quality of life in relation to socio-demographic factors?
- Is there any significant relationship between cognitive functioning, emotional regulation and quality of life among adolescents with varied levels of digital screen use?
- Is there a significant impact of varied levels of digital screen use on cognitive functioning, emotional regulation and quality of life in adolescents?

Hypotheses of the study

Ha_1: There is a significant difference in cognitive functioning (problem solving and memory), emotional regulation and quality of life in adolescents with varied levels of digital screen use across age, domicile and gender.

Ha_2: There is a significant relationship between cognitive functioning (problem solving and memory), emotional regulation and quality of life among adolescents with varied levels of digital screen use.

Ha_3: There is a significant impact of varied levels of digital screen use on cognitive functioning (problem solving and memory), emotional regulation and quality of life in adolescents.

Operational definitions

Adolescence: The phase of lifespan leading to major physical and psychological changes ranging the age group from 10 years to 19 years.

Digital screen use: refers to the self-reported measure of behaviours interacting with the screen-based devices through five constructs such as studying, playing games, using social media or chat applications and working/internship-related activities in weekdays and weekends.

Memory: refers to working memory which indicates the capacity of an individual to remember and influence the information stored in a short-term memory.

Problem solving: It is the process of finding solutions to overcome the obstacles that impede progress toward accomplishment of goals.

Emotional regulation: refers to the self-evaluation of managing one's positive and negative emotions through emotional experience and emotional expression in response to daily activities.

Cognitive reappraisal: refers to cognitive strategy in the emotional regulation which involves reinterpretation of emotions leading to positive change.

Expressive suppression: refers to strategy in the emotional regulation which involves inhibition of expressive behaviour.

Quality of life: a person's perspective on life, shaped by cultural norms, systems and values.

Health related quality of life: an individual's perception of health in terms of physical well-being, parent relations and autonomy, psychological well-being, school environment and social support and peer groups within the contexts of one's culture, values and societal systems.

Physical well-being: refers to physically fit, active, healthy and energetic.

Psychological well-being: refers to happy, satisfied with a positive view of life and balanced emotions.

Parent relations and autonomy: refers to having harmonious relationship and healthy bond with parents, independence appropriate to age in choosing things in regard to relationships, feeling well and happy with the financial resources.

Social support and peers: refers to feeling supported and included in the peer group.

School environment: refers to feeling happy and doing well with the school activities.

Variables

Independent variable: varied levels of digital screen use, gender, age, domicile

Dependent variable: cognitive functions, emotional regulation, quality of life

Sample

The sample size of the study was 600 adolescents with the age of 10 to 19 years studying in schools and colleges of Dakshina Kannada district. The sample was collected through systematic random sampling method. The study adopts Expost facto cross sectional research design. The sample was divided into early phase of adolescence with an age group of 10-14 years, middle phase of adolescence ranging from 15-17 years and late phase of adolescence with 18-19 years age and were assessed based on the level of digital screen use as high, moderate and low.

Age	Early phase of adolescents	Mid phase of adolescents	Late phase of adolescents	Total
Number	200	200	200	600

Inclusion criteria

- Adolescents with varied level of digital screen use for various activities.

Exclusion criteria

- The adolescents with any form of physical disabilities.

Research Tools

1. Socio-demographic information, Appendix I

The researcher developed the socio-demographic data sheet including the information of the participant such as name, age, gender, class, school/college name, place, district, domicile, parents name, age, qualification and occupation, number of siblings, birth order, address, contact number, socio economic status of the family, electronic devices own, hobbies, aim and role model of the participant are collected through socio-demographic sheet.

2. The Questionnaire for Screen time of adolescents (QueST) developed by M. T. Knebel, B. G. da Costa, P. C. dos Santos, A. C. de Sousa & K. S. Silva (2020)

QueST helps to assess the established screen time behaviours across five distinct frameworks. This includes, performing work/ internship -related activities, studying, using social media or chat applications, watching videos and playing video games in adolescence. Screen time was assessed in weekday from Monday to Friday and on Saturday and Sunday considered under weekends.

The usage of digital screen is classified under three levels. Low level refers to 0-3 hours, Average level refers to 4-6 hours and high level refers to 7 & above hours.

Reliability and validity: The intraclass correlation coefficient (ICC) of test -retest reliability was measured for each construct. During weekdays, the ICC scores are as follows: studying (0.70), working (0.64), watching videos (0.56), video gaming (0.72), and using social media (0.83) respectively. During weekends, ICC scores are as follows: studying (0.56), working (0.58), watching videos (0.41), video gaming (0.72) and using social media (0.77). The content validity index for scales is 0.94 and proved fair to excellent in using this scale to assess different constructs of screen time.

3. Wechsler memory scale III edition by David Wechsler (1998)

Wechsler Memory Scale is a battery which involves assessment of learning and working memory. The current study has considered the measure of working memory in the sample.

a. Letter-Number sequencing: In this test, a series of alternating letters and numbers will be presented (e.g., 8-Y-2-U) by the examiner and the examinee is expected to repeat asked to repeat them by arranging numbers in ascending order and letters in alphabetical order. The length of the string will be increased gradually from two to eight elements. Each item includes 3 trails, and each trial has the combination of numbers and letters which has different combination. The test to be discontinued after the error in the string which scores 0 on all three trails of an item.

b. Digit span: For digit span forward, the examiner will read a series of digits which an examinee is supposed to repeat the same order. Next, in digit span backward, the examiner reads a series of digits where examinee is asked to repeat them in reverse order. The length of the items increases

gradually in both the conditions. The test continues, if an examinee passes the first trial and response are recorded. After score of 0, the trials will be discontinued.

Here, examinees are expected to check on the letters and numbers and remember, re-sequence them. This process in stimuli is referred as working memory. The scale has strong internal consistency with test-retest reliability coefficient ranging between .74 and .93 for the primary subtest scores, which includes all the age groups. For logical memory I, the reliability is above .90. The scale has good construct, content and criterion validity.

3. Problem solving ability test developed by L.N Dubey (2011)

The test will enable us to measure the problem-solving ability. The test constitutes 20 items which are highly distinguishing. Scoring: Each of the 20 statement has four choices, with only one correct response and the right answer is scored as 1. The total raw scores are converted to z scores. The scores are formed differently for boys and girls. The reliability co-efficient found in Spearman-Brown formula is 0.78. The co-efficient of validity is 0.67 and 0.85.

4. Emotional regulation questionnaire for Children and Adolescents (ERQ-CA) by Eleonora Gullone and John Taffe (2011)

ERQ-CA assess emotional regulation in two strategies such as cognitive reappraisal and expressive suppression. It comprises total 10 items, out of them six items belong to cognitive reappraisal strategy and four items are expressive suppression. All the items are rated on a five point - Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = half and half, 4 = agree, 5 = strongly agree. High scores refer to higher use of respective strategy. Internal consistency of the test is .79 for cognitive reappraisal and .73 for expressive suppression.

5. Kidscreen-27 to assess quality of life, developed by Prof. Dr. Ulrike Ravens-Sieberer (2006)

The KIDSCREEN-27 instrument is used to measure five dimensions of health-related quality of life. The five items in the scale assess physical well-being, seven items measure psychological well-being, seven items measure autonomy & parent relations, four items assess social support & peers and other last four items assess school environment. The responses are scored on a five-point rating scale ranging from never or not at all to always. All the items to be answered with reference to last week. The test takes approximately 10 to 15 minutes for the completion.

Reliability: The Cronbach's Alpha, internal consistency values range between .79 and .84 satisfactorily. Validity: The test was assessed for discriminant validity and convergent validity showing satisfactory result. In addition to this, this test also considered valid for the cross-cultural assessment of health-related quality of life among children and adolescents.

Procedure

The quantitative data was collected by obtaining the assent and informed consent from the sample. The purpose and objectives of the study were explained. The consent form from the parents stating the details such as voluntary participation of their son/daughter in the research, regarding the

benefits and confidentiality was undertaken. Assent form was also obtained from the participants. The permissions were also obtained from the head of the institutions for the data collection of students. Having followed by all the ethical considerations, rapport was established with the participant and socio demographic details were collected through semi-structured interview and examined for meeting the inclusion criteria of the study. Noting the demographic data, questionnaire for the screen time of adolescents followed by all other assessing tools were administered with the appropriate instructions one after the other with a minimum time break between each.

Pilot Study

The pilot study was conducted on 84 adolescents who use digital screen. In 84, 42 where adolescent boys and 42 were adolescent girls. The objectives of the pilot study are as follows:

- To test the adequacy of the tools.
- To determine the duration of time required in completion of the tools.
- To test the feasibility of the questionnaires.
- To check the sampling design adopted for the study.

Findings from the pilot study

The result of the pilot study showed the feasibility of the questionnaires, where the participants were comfortable answering the questionnaires and did not find any difficult in understanding the questions in the tools. The order of assessment of tools were appropriate to test the objectives.

Ethical consideration

Ethical criteria for the research were considered and followed by obtaining the informed consent from the parents and assent form from the children below 18 years. Permission from the head of the educational institutions were obtained as a part of data collection. Participants were assured of confidentiality, voluntary participation with due consideration of no economic benefits in the process, acceptance of withdrawal from the study for any reasons, use of research data only for the purpose of research and free to ask any queries while answering the questionnaires.

Statistical Analysis

Quantitative data was analyzed using descriptive statistics such as percentage, mean and SD and inferential statistics like Kruskal-Walli's test, MANOVA, correlation and path analysis. The path analysis was used for the data to test the hypothesis. The data was tested for normality test.

- The hypothesis (Ha_1) was tested using MANOVA and Kruskal-Walli's test.
- The hypothesis (Ha_2) was tested using Spearman Rank Correlation.
- The hypothesis (Ha_3) was tested using Path Analysis.

MAJOR FINDINGS

6.1.1: Demographic details of the data

- Majority of the sample have shown high level of digital screen use and reported more among male adolescents compared to female.
- In the Early adolescence phase, higher cognitive functioning has been found in high level digital screen users. In the Mid-adolescence phase, higher cognitive functioning has been found in average level digital screen users. In Late adolescence phase, lower screen users shown high level of memory whereas average screen users shown higher problem- solving ability.
- The high-level digital screen users adopt cognitive reappraisal for regulating the emotions whereas low level digital screen users adopt expressive suppression for regulating the emotions in Early adolescents. In Mid-adolescence phase, low level digital screen users adopt cognitive reappraisal for regulating the emotions whereas high level digital screen users adopt expressive suppression for regulating the emotions. Average level digital screen users use both cognitive reappraisal and expressive suppression in Early and Mid-adolescents. Among Late adolescents, average digital screen users and low-level digital screen users adopt cognitive reappraisal for regulating the emotions whereas low and high-level digital screen users adopt expressive suppression for regulating the emotions.
- Among Early adolescents, low and average level digital screen users have shown high level of quality of life. Among Mid adolescents, average level digital screen users shown high quality of life on all the dimensions except physical well-being. In Late adolescence phase, low level digital screen users have shown high level of quality of life under the dimension of psychological well-being, parent relations and autonomy, also the school environment and high-level digital screen users scored high under physical well-being and friends and peer group.

6.1.2: Interaction of domicile and gender on cognitive functioning, emotional regulation and quality of life among adolescents with varied levels of digital screen use

- There is no significant interaction among levels of digital screen use, domicile and gender on memory in Early adolescents. Gender has an effect on memory. Domicile and gender together show an effect on memory. There is no significant interaction among varied level of digital screen use, domicile and gender has no significant effect on memory in Mid and Late adolescents.
- There is no significant effect among varied level of digital screen use, domicile and gender on problem solving in Early, Mid and Late adolescents. Gender has a significant effect on problem solving among Early and Late adolescents.
- There is a significant effect among rural female Early adolescents and varied level of digital screen use on cognitive reappraisal. There is no significant effect of domicile, gender and levels of digital screen use on cognitive reappraisal among Mid adolescents. There is no

significant interaction among varied level of digital screen use, domicile and gender on cognitive reappraisal in Late adolescents.

- There is no significant interaction among varied level of digital screen use, domicile and gender on expressive suppression in Early, Mid and Late adolescents.
- There is no significant interaction among varied level of digital screen use, domicile and gender on physical well-being in Early, Mid and Late adolescents. Gender has a significant effect on physical well-being among Late adolescents.
- There is no significant interaction among varied level of digital screen use, domicile and gender on psychological well-being in Early, Mid and Late adolescents. Gender has a significant effect on psychological well-being among Mid adolescents.
- There is no significant interaction among varied level of digital screen use, domicile and gender on parent relations and autonomy in early, mid and late adolescents. Gender has a significant effect on parent relations and autonomy. The interaction of domicile and gender also effects on parent relations and autonomy in Early adolescents. Domicile and gender have a significant effect on parent relations and autonomy in Mid adolescents. The interaction among domicile and gender, also domicile and digital screen usage has a significant effect on parent relations and autonomy in Late adolescents.
- There is no significant effect on social support and peers among varied level of digital screen use, gender and domicile in Early, Mid and Late adolescents.
- There is no significant interaction among varied level of digital screen use, domicile and gender on school environment in Early, Mid and Late adolescents. Digital screen use and gender has a significant effect on school environment. Domicile and gender interaction has a significant effect on school environment in Late adolescents.

6.1.3: Relationship between cognitive functioning, emotional regulation and quality of life among adolescents with varied levels of digital screen use.

- Memory significantly associated with multiple dimensions of quality of life. Multiple dimensions of quality of life are interrelated among Early adolescents with low level of digital screen use. The result emphasizes the importance of physical well-being, family relationships and good social support in enhancing cognitive and psychological well-being in the group, also showing the importance of use of cognitive reappraisal in development of problem-solving skills in Early adolescents.
- Cognitive and emotional well-being are influenced by the family support, peer support and the school environment. Cognitive reappraisal emotion regulation strategy contributes to problem solving and psychological well-being. Also, the dimensions of quality of life are correlated to each other among Early adolescents with average level of digital screen use.
- A significant relationship exists between memory and problem solving, reinforcing the link between cognitive functions. The correlation among the variables suggests the promotion of positive parent-child relationships, enhancement of school environment and

encouraging the social support systems which might contribute to the better problem-solving skills and overall well-being of the early adolescent with high level of digital screen use. High digital screen users show strong interconnections among well-being factors, social relationships and school environment suggesting a complex interaction between digital screen use and overall quality of life.

- Memory significantly associates with cognitive reappraisal indicating the good relation between memory function and adaptive emotional regulation strategies, also significantly correlates with well-being factors emphasizing the influence of family and environmental support. The study underlines the importance of family dynamics in adolescent development showing the significant relationship between parent relations and autonomy, psychological well-being and school environment. Social support and peers have no significant relationship showing less influence of peers among Mid adolescents with low digital screen use.
- The significant relationship between memory and physical health shows the connection between cognitive function and overall health. Emotional regulation strategies show the negative association with problem solving ability among Mid adolescents with average digital screen use. The relationship among the quality of life shows the impact of social and environment factors, significance of school and family settings and reinforcing the peer relationships on adolescent development.
- The findings show that high levels of digital screen use in Mid adolescents do not strongly affect memory and cognitive reappraisal. The relationship between emotional regulation, social support and problem solving shows the contribution of emotional and social factors towards cognitive problem-solving ability. Therefore, complex interactions are found between digital screen use, cognitive and emotional development and social support systems.
- Late adolescents with low level of digital screen use might support cognition and emotional regulation, also towards overall psychological and physical well-being through strong social and familial connections.
- Memory does not show a significant relationship; however other cognitive and emotional factors show strong interconnection. The significant relationship among the variables shows critical role of social, familial, and academic support in fostering psychological, emotional and physical well-being among adolescents with average level of digital screen use. The study also suggests that a strong social support enhances the cognitive skills.
- The correlation among Late adolescents with high level of digital screen use shows that the strong social support, emotional regulation strategies along with a comfortable and supportive school environment might contribute to the cognitive, emotional and physical well-being. As high digital screen use may associate with negative outcomes among late adolescents, maintaining the healthy interpersonal relationships, developing effective emotional regulation strategies could help to mitigate potential adverse effects.

6.1.4: Impact of varied levels of digital screen use on cognitive functioning, emotional regulation and quality of life in adolescents.

- Parental relationships, school environment, and physical well-being has shown significant impact on cognitive functioning, emotional regulation, psychological well-being, and social support among Early adolescents with varied level of digital screen use.
- Parental relationship and physical well-being serve as key predictors of positive outcomes such as social support, memory, and psychological well-being among low level digital screen users.
- The parental relationship shows a significant and moderately strong relationship with physical health suggesting that better parental relationships are associated with better physical health in Early adolescents with average level of digital screen use. The school environment also exhibits a marginally significant relationship with physical health indicating a potential influence of the school setting on Early adolescents' physical well-being.
- The significant association between parental relationship, school environment and physical well-being among Early adolescents with high level digital screen use emphasize the importance of cohesive and supportive home and school environments in promoting overall well-being in this group.
- Parental relationship is found to be a powerful predictor of school environment in Mid adolescents with low level of digital screen use. In addition to this, physical well-being has an influence on psychological well-being which can be enhanced through memory and cognitive reappraisal emotional regulation strategy.
- Problem solving plays an important role in influencing expressive suppression and physical well-being among Mid adolescents with average level of digital screen use.
- The positive effect among the factors like parental relationship on school environment, physical well-being on psychological well-being highlights the importance of moderating the screen time, increasing the physical activities and enhancing the social support in Mid adolescents with high level of digital screen use.
- The factors such as physical well-being and parental relationship are closely associated with each other in Late adolescents with low level digital screen users.
- Social support has a strong and direct impact on school environment among Late adolescents with average level digital screen use along with positive influence from parental relationship. Whereas, school environment also has an indirect effect from problem solving ability of an adolescent.
- Social support has a major impact on enhancement of memory and cognitive reappraisal among Late adolescents with high level of digital screen use, which also depicts the negative relationship between expressive suppression and school environment. This suggests the importance of educating this group with potential emotional coping mechanism in order to enhance their psychological well-being.

- The findings suggest that interventions targeting social support and the regulation of emotional responses like cognitive reappraisal and expressive suppression could be valuable for enhancing adolescents' well-being, while further exploration is needed to understand the complexities of these relationships.

Limitations:

- The inclusion of sample from only Dakshina Kannada might limit the generalizability of the findings.
- Quality of life and Digital screen use assessment does not include the parent/s measures.
- The sector of physically differently abled adolescents was not considered in the study.
- Self-report measure was used for data collection. This might limit the accuracy of data owing to social desirability.

Implications:

- Need of counselling and a psychologist in education sector.
- Planning the interventions for the students tested with high level of digital screen use.
- Awareness and psychoeducation on role of parents and teachers in monitoring the screen use in adolescents.

Scope for further research:

- Behavioural intervention studies can be planned.
- Longitudinal research study can be undertaken.
- As parents might play a mediating role in association with screen use in adolescents, future research might focus on this factor.
- Additional socio-demographic factors such as socio-economic status, number of siblings, parental occupation, family environment and qualification can be considered for the studies.

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